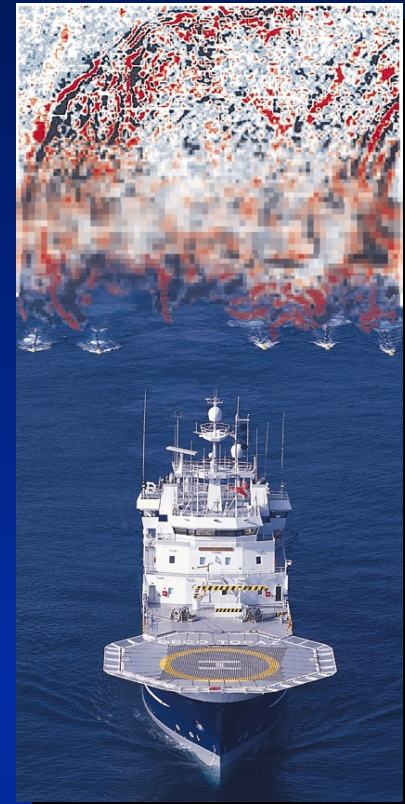


What is Q-Xpress?



CHANGING THE GAME

Andy Peters
Q-Xpress Champion



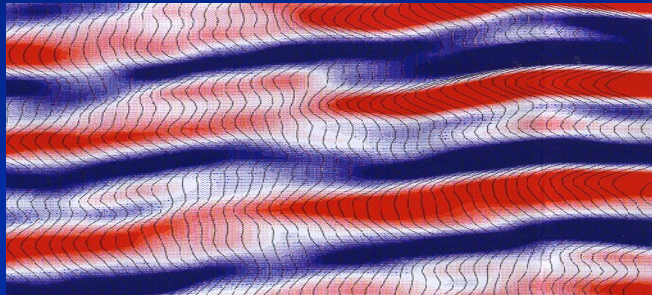
Q-Xpress - a summary

- **Problem:** Project turn around time too long for reservoir development cycle
- **Vision:** Dramatically reduce turnaround via technology and process innovation
- **Strategy:**
 - Phase 1: [2003]
 - Quick process improvements: 46% reduction in TAT during H2 2003
 - Identify technology bottlenecks and launch R&D projects to address
 - Phase 2: [2004+]
 - Deploy Integrated Acquisition/QC/QA & Processing system
 - In acquisition time deliverables (e.g. Fast Track Cubes days after last shot)
 - Turnaround in 2004 40% less than 2003 average
- **Deliverables:**
 - Eliminate repetition & workarounds
 - 100% QC & Nav merge infield
 - No data surprises; identify problems and fix as early in the workflow as possible
 - Optimisation; minimise data management and maximise user time in-front of the data
- **Availability:**
 - System #1 currently in Topaz; #2 by Sept 15th; #3 by year end.



Q - Enabling seismic solutions to evolve

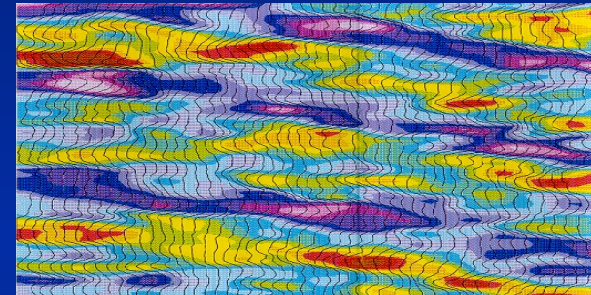
From



**Reservoir location
and structural
definition**



To



**Reservoir properties
and management**

**1st 3D's shot early 1990's - it time to repeat acquisition
Requires delivery in "Reservoir decision timeframe"**

Why do we need to change? - The Problem

Turnaround time too long for reservoir needs

- **Larger data volumes - Q**
 - Up to 50TB for a large GoM survey; 5-10 TB in North Sea.
- **Processing complexity**
- **Incomplete field QC**
 - Data gaps, missing shots & traces, noisy data, incorrect obs. logs...
- **Disjointed workflows**
 - Manual transfer of edits & attributes; multiple data entry
 - Too much time spent testing and “managing” data
 - Software problems / bugs / workarounds
 - Internal and client decision making time
- **Integrated projects**
 - Poor or no project management between Acquisition and DP
 - Communications between in-field and onshore DP
- **Workflow variations** (regional not geological)



What do we want to be? - The Vision

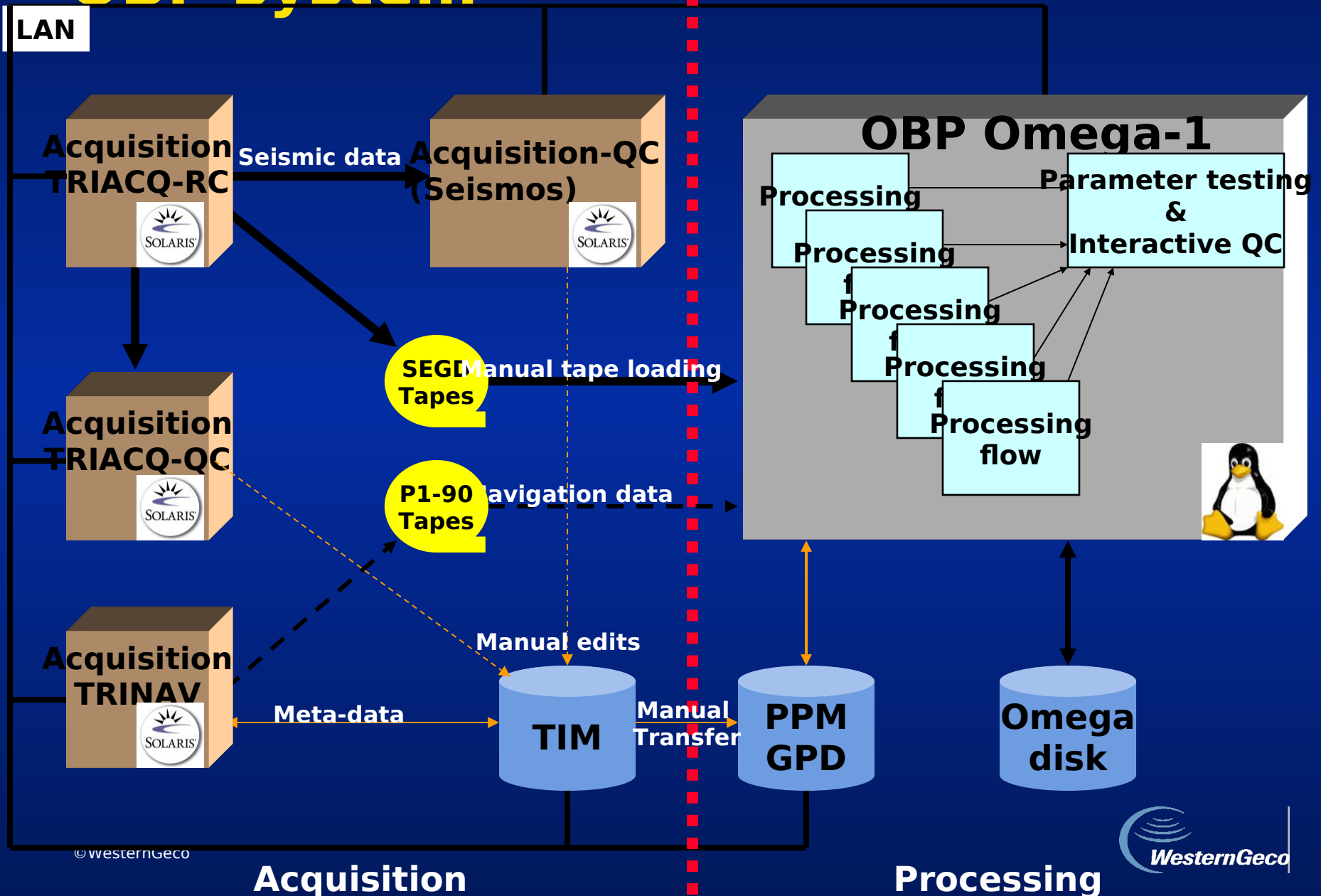


- **Dramatically reduce the turnaround** of Q-projects to enable the widespread use of Q-Seismic for reservoir solutions
- Achieve this with **technological and process** innovation such that our **turnaround becomes a market differentiator**.
- The combination of high quality/value Q-seismic with **“in acquisition timeframe”** deliverables becomes the preferred reservoir seismic solution for our **clients**
- Provide a key building block in enabling WesternGeco to achieve industry superior returns on Q services

Most Q-Xpress initiatives are equally applicable to non Q data.

Current Acquisition OBP system

&



Integrated System

LAN

TRIACQ-RC

Seismic data

Processing -
Data Validation
Nav Merge

Shared
hardware /
software
platform

Omega 2

Conditioning
Noise
Attenuation

Velocity
Analysis

All systems
access data
from shared
disk.

TRIACQ-QC



Shared

Demultiple
Signal
Enhancement

Time
Migration

Meta data and
edits passed
automatically
between
databases

"No data
surprises"
between all
workflows

TRINAV



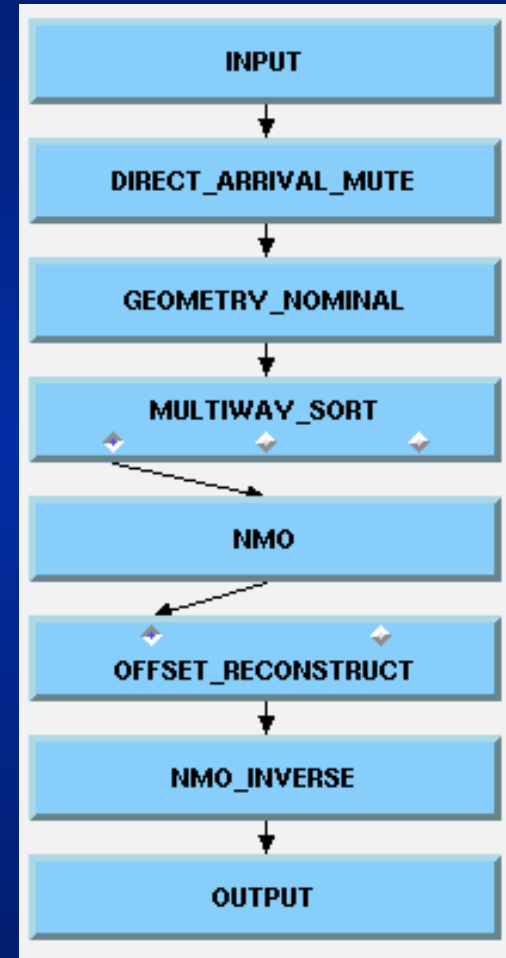
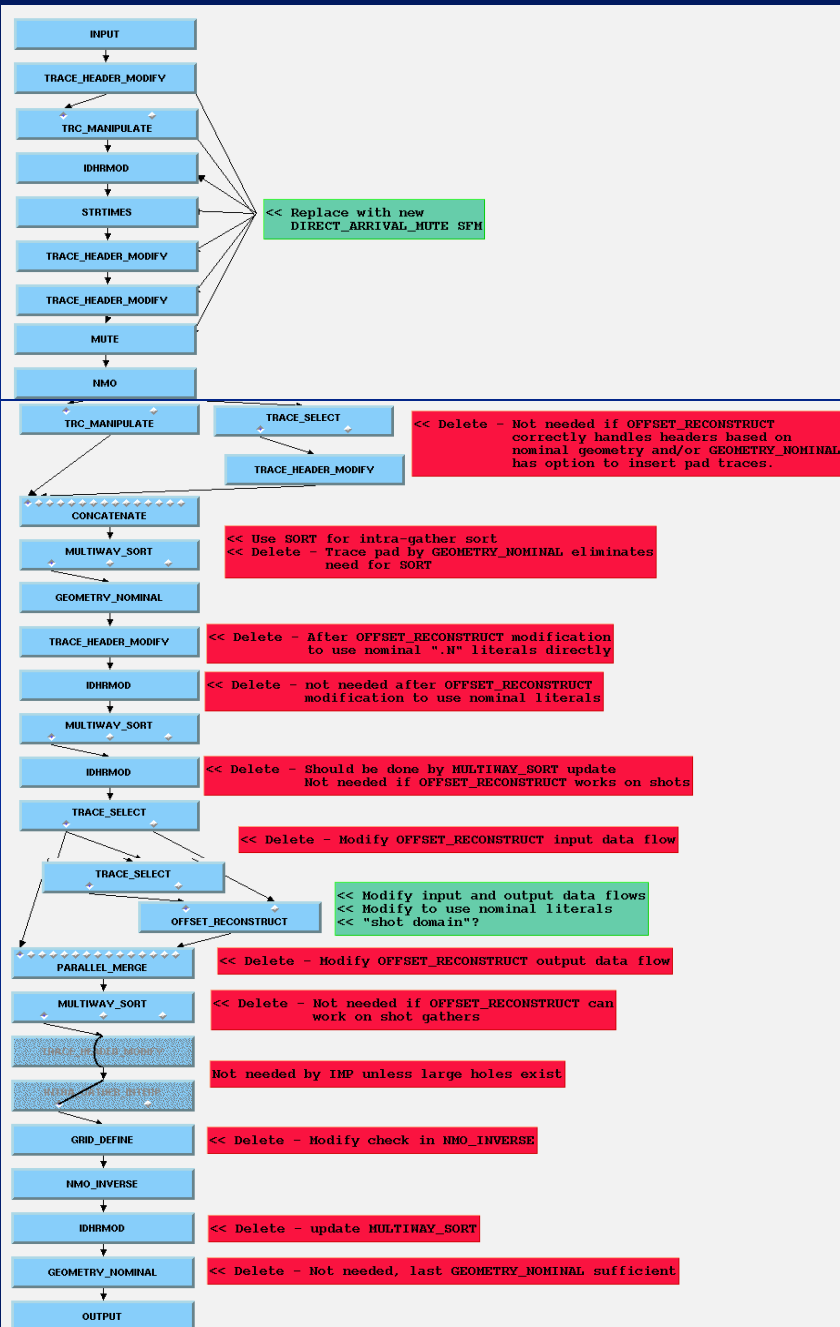
Meta-data

TIM

OPM

Omega disk
20Tb

IMP demultiple workflow optimization



The diagram illustrates the data processing pipeline for the ST1-Preconditioning experiment. It shows the flow of data from acquisition hardware through various processing and storage components to final data storage and analysis.

Acquisition Hardware:

- Q-Land CS (Sven Furburg):** 40-160 Mbit/s
- Trifac RC (Tefi OR):** 40 Mbit/s
- BEO-D (Raw SS):** 40 Mbit/s
- BEO-A (RAW):** 40 Mbit/s
- BEO-M (RAW):** 40 Mbit/s

Processing and Storage Components:

- GeoDB (Vincent Belongue):** Shared Fiber Channel disk buffer (4TB (DB Usable)) SANergy
- Data Manager (v2):** Message Cartridge, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, Dave Holmes
- Data Manager 2:** Message Cartridge, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, Dave Holmes
- ST1-Preconditioning (Joan Benoit):** Buffer Input SPM, TrifacAux, split, GC Edits, Gather Interpolation, Data File Merge, Geometry, Lofine, LACOMA (optional), L-7/F-7/8 Drop (optional), Data File Decom, & Cool, RS-232 Output
- Data Processing OPM:** Data Manager, Message Cartridge, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, DV Shot Provider, Dave Holmes

Data Flow and Connections:

- 40-160 Mbit/s:** Connection from Q-Land CS to GeoDB.
- 40 Mbit/s:** Connection from Trifac RC to GeoDB.
- 40 Mbit/s:** Connection from BEO-D to GeoDB.
- 40 Mbit/s:** Connection from BEO-A to GeoDB.
- 40 Mbit/s:** Connection from BEO-M to GeoDB.
- 40 Mbit/s:** Connection from GeoDB to Data Manager (v2).
- 40 Mbit/s:** Connection from GeoDB to Data Manager 2.
- 40 Mbit/s:** Connection from GeoDB to ST1-Preconditioning.
- 40 Mbit/s:** Connection from GeoDB to Data Processing OPM.
- 40 Mbit/s:** Connection from Data Manager (v2) to Data Manager 2.
- 40 Mbit/s:** Connection from Data Manager 2 to ST1-Preconditioning.
- 40 Mbit/s:** Connection from Data Manager 2 to Data Processing OPM.
- 40 Mbit/s:** Connection from ST1-Preconditioning to Data Processing OPM.
- 40 Mbit/s:** Connection from Data Processing OPM to Data Manager 2.
- 40 Mbit/s:** Connection from Data Processing OPM to Data Manager (v2).
- 40 Mbit/s:** Connection from Data Processing OPM to ST1-Preconditioning.

Other Labels and Notes:

- Shot Provider currently on San Solars:** Will be rolled in Linear RHD box
- 11 nodes allocated to DV Net included in the alpha test:** Writes out a lot of data
- CMR traces for microwave RPD:** Internal Backup
- BlueArc S6000 Omega Data Disk (Raid):** 20TB
- 40 nodes allocated to ST1 & 8 not given:** ST1-Preconditioning
- 40 nodes allocated to ST1 & 8 not given:** Data Processing OPM
- 40 nodes allocated to ST1 & 8 not given:** Data Manager 2
- 40 nodes allocated to ST1 & 8 not given:** Data Manager (v2)
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- 40**

Installation on Topaz end March

Integration testing starts November 03

Software completed by end October

Hardware shipped to Oslo end September

Review meeting held end August 2003

Q-Xpress project proposed June 2002...

Commercialisation Requirements

- **Q Project management adopted**
- **Acceptance of standardised**
- **Topaz installation works**
- **System backup plans available**
- **WDS used for all relevant Q surveys**
- **InTouch support functioning**
- **Training provided**



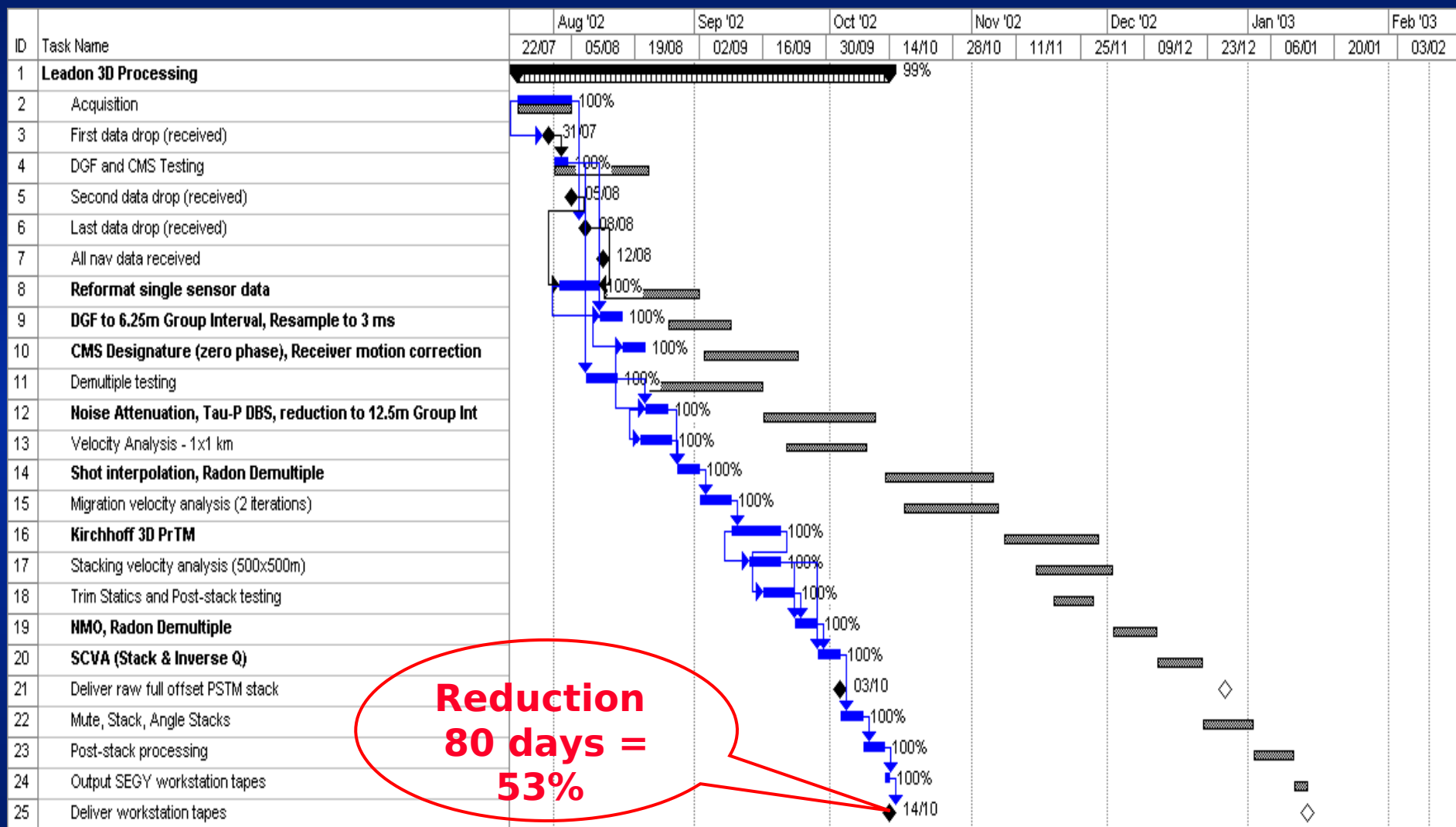
Working well

Work still required

**Not working or poor at
present**

Leadon (A 105 sq km Q Reservoir Project)

Predicted impact of Q-Xpress



Integrated System Deployment

- **Q1 2004 Topaz***
- **Q3/4 2004 Pride, Searcher**
- **Q1 2005 Neptune**
- **Hardware investment ~ \$750k per vessel**
 - CPU capacity ↑ 225 %
 - Memory ↑ 250 %
 - Disk capacity ↑ 500 %
- **Integrated hardware becomes part of vessel assets**

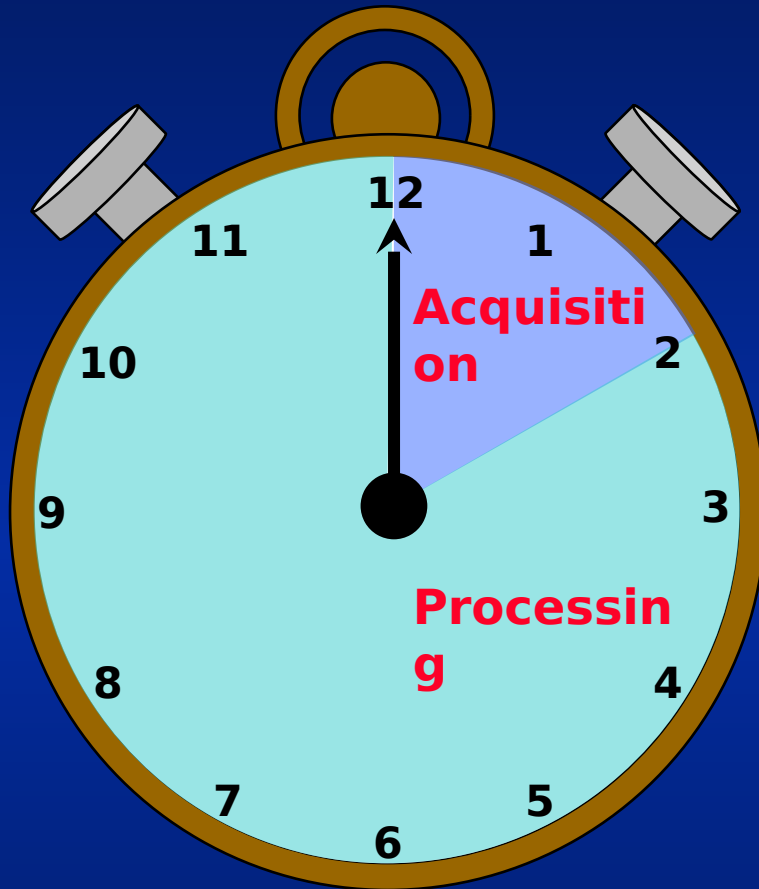
vessel names subject to change depending upon the final acquisition schedule



CHANGING THE GAME

- **Connectivity & bandwidth between onshore and vessel**
 - Increase all Q-vessels from 128kbs to 256kbs
 - Implement OmegaGlobal - enables remote processing
- **Decision making time frame**
 - Clients
 - Ourselves
- **Buy in from operations**
 - Optimisation does not mean “dumbing down”
 - Prove cost reductions and increase in competitiveness
 - Show equipment utilisation increase
 - Show turnaround improvements
 - Demonstrate client need (ENI, Statoil, CTX)

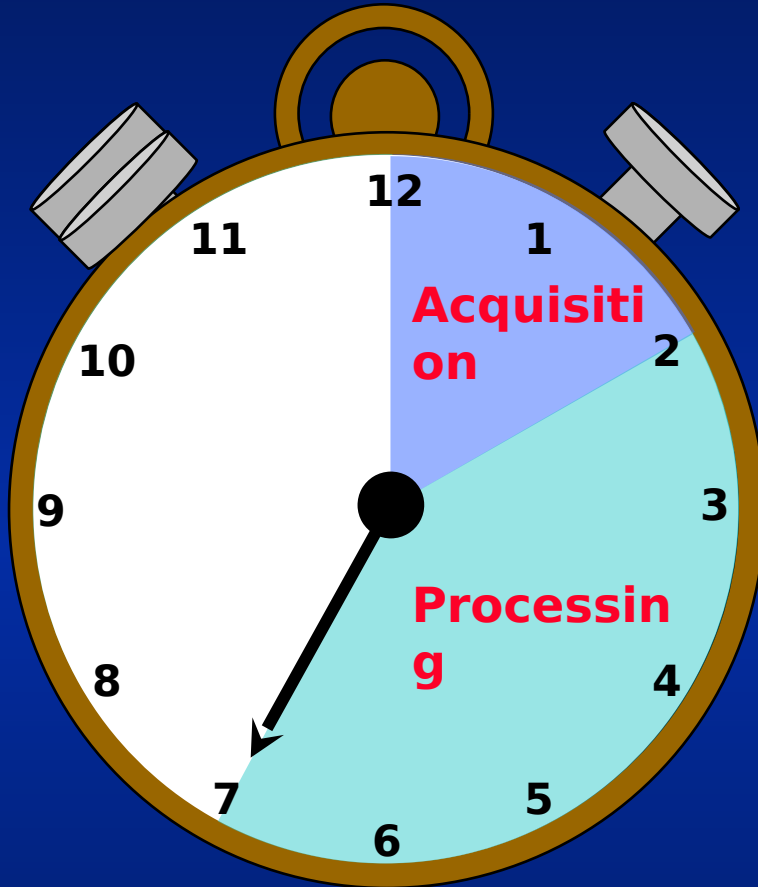
0 - *Xpress*: A project to dramatically reduce turnaround time



Current situation

- Every 2 months of acquisition needs 10 months of processing

0 -Xpress: A project to dramatically reduce turnaround time



Current situation

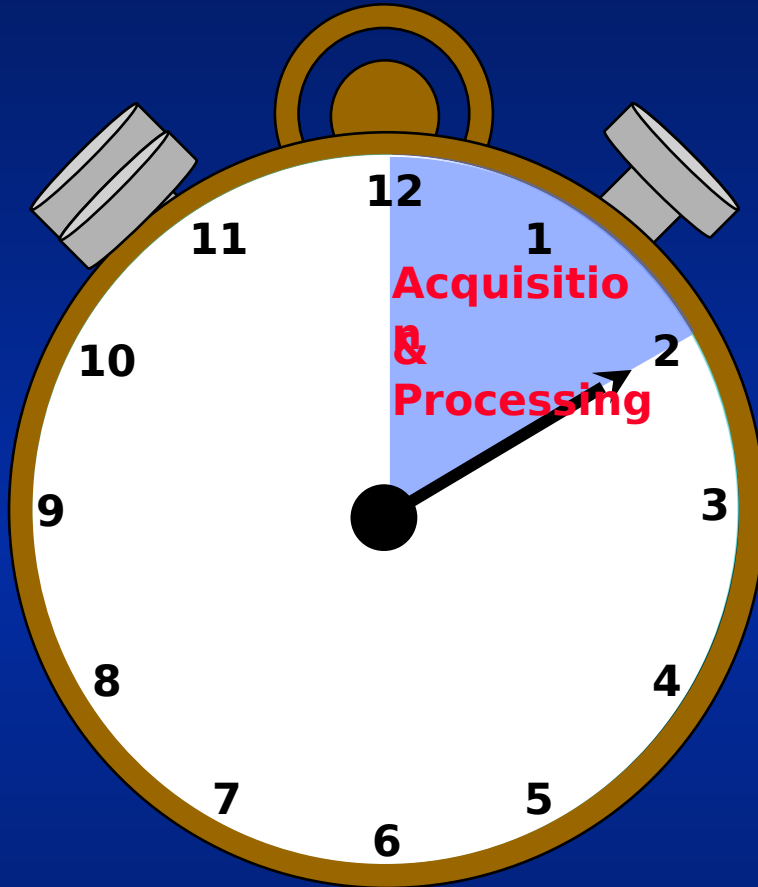
- Every 2 months of acquisition needs 10 months of processing

Phase 1:

Reduce turnaround 50% by end 2003

- Use standard “Best Practices”
- Optimise processing workflows
- Identify and eliminate roadblocks

0 -Xpress: A project to dramatically reduce turnaround time



Current situation

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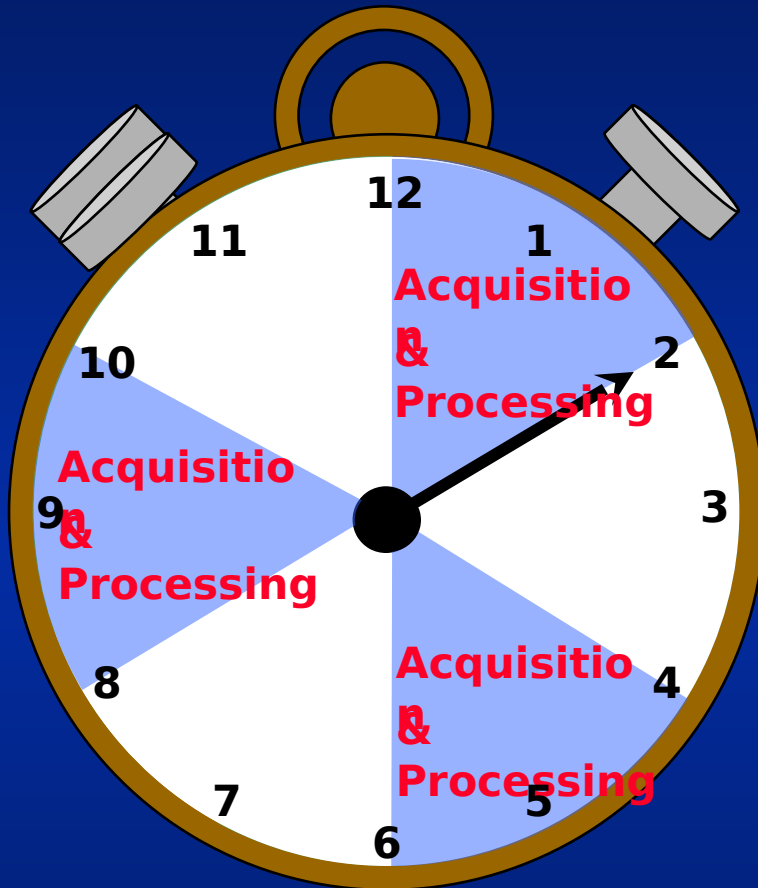
- Use standard “Best Practices”
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Phase 2:

Deliverables “In Acquisition Time”

- Integrated acquisition & processing
- Automated processing

Q-Xpress: A project to dramatically reduce turnaround time



Q-Xpress

- Enables the rapid repeat of 4D surveys

Current situation

- Every 2 months of acquisition needs 10 months of processing

Phase 1:

Reduce turnaround 50% by end 2003

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- Identify and eliminate roadblocks

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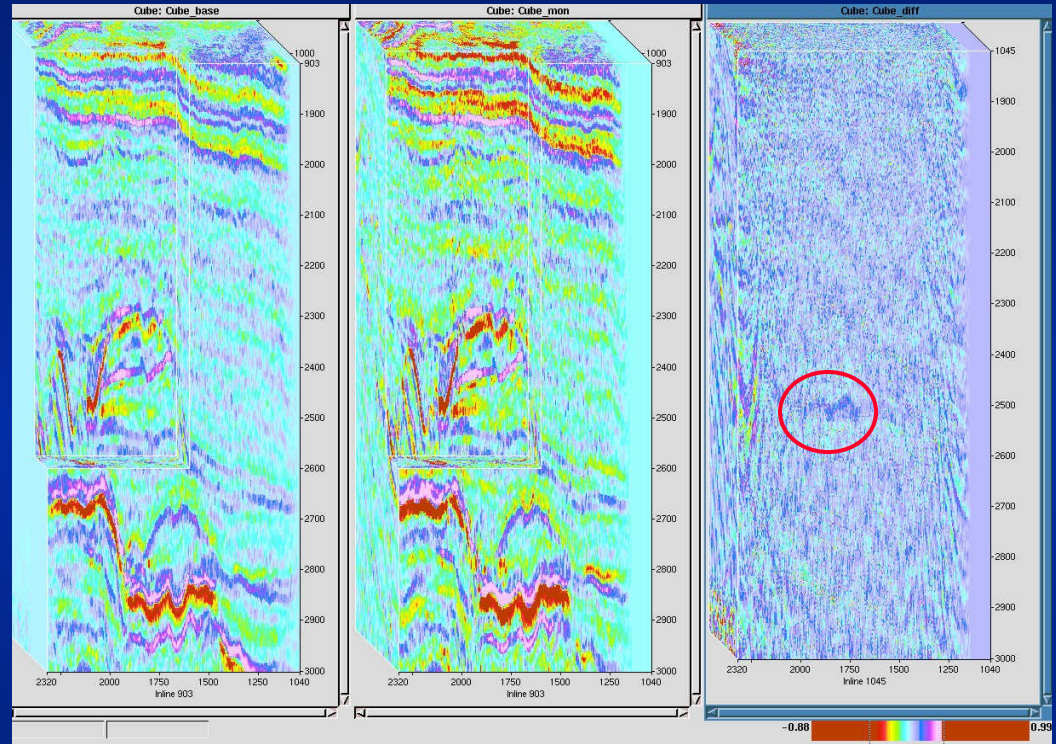
Is there client value in a Fast Track Cube?

- "The side-track is planned sometime this autumn, and we are now working hard to define the location of this well. **Here the fast-track data is very important**, since it shows some different water movement than that indicated by the reservoir simulation model. **We therefore most likely have to change the current well path that was planned prior to the 2003 4D data.**

We have to have a location ready by 1st Aug. so it was very important to have this fast-track data ready so quickly after the completion of acquisition.

So many thanks to you for this!"

Statoil 24th July 2003. (Norne 4D survey)



2003

Why do I have
to process my
Q data with
WesternGeco...
?



CHANGING THE GAME

WesternGeco's
quality and
service delivery
is so good I
want to process
my Q data with
them all the
time!

2005



***Enables consistent service
quality and delivery within the
acquisition time frame.***